WHAT WE CLAIM ARE:

1. A method of manufacturing a semiconductor device, comprising steps of:

forming a first film on a semiconductor substrate, the first film being made of material having a different etching resistance from silicon carbide;

forming a second film on the first film, the second film being made of hydrogenated silicon carbide;

forming a resist film with an opening on the second film;

dry-etching the second film by using the resist mask as an etching mask and mixture gas of fluorocarbon gas added with at least one of SF_6 and NF_3; and

etching the first film by using the second film as a mask.

2. A method of manufacturing a semiconductor device, comprising steps of:

preparing a substrate having a conductive region exposed on a partial area of an insulating surface of the substrate;

forming a first film on the surface of the substrate, the first film being made of hydrogenated silicon carbide;

forming a second film made of insulating material on the first film;

forming a resist film with an opening on the second film;

etching the second film by using the resist mask as an etching mask to form a recess and expose a partial surface area of the first film on the bottom of the recess;

ashing and removing the resist film;

dry-etching the first film exposed on the bottom of the recess by using mixture gas of fluorocarbon gas added with at least one of SF_6 and NF_3 to expose the conductive region of the substrate; and

burying a conductive member in the recess.

3. A method according to claim 2, wherein the conductive region exposed on the partial area of the insulating surface of the substrate is a copper wiring.

4. A method according to claim 3, wherein an upper surface of the copper wiring is covered with a barrier metal layer made of material selected from a group consisting of Ta, TaN, Ti and TiN.

5. A method according to claim 2, wherein the second film is a film selected from a group consisting of a silicon oxide film, a film of phosphosilicate glass, a film of borophosphosilicate glass, a film of fluorosilicate glass, a film of hydrogen silsesquioxane, a film deposited using tetraethylorthosilicate as a source, a film formed by spin-on-glass, a film of carbon-containing silicon oxide, a silicon-containing foaming porous film, and an insulating film of organic material.

6. A method according to claim 2, wherein the step of forming the first film forms the first film by chemical vapor deposition using tetramethylsilane and carbon dioxide as source gasses and by setting a ratio of a flow rate of tetramethylsilane to a flow rate of carbon dioxide to a range from 0.2 to 0.6.

7. A method of manufacturing a semiconductor device, comprising steps of:

preparing a substrate having a conductive member exposed on a partial area of an insulating surface of the substrate;

forming a first film on the surface of the substrate, the first film being made of hydrogenated silicon carbide;

forming a second film made of insulating material on the first film, the insulating material having a different etching resistance from silicon carbide;

forming a third film on the second film, the third film being made of hydrogenated silicon carbide;

forming a resist film with an opening on the third film, the opening overlapping with a partial area of the conductive member as viewed along a line parallel to a normal to the substrate surface;

etching the third film by using the resist mask as an etching mask and using mixture gas of fluorocarbon gas added with at least one of SF_6 and NF_3;

etching the second film by using the resist mask as an etching mask under a condition that an etching rate of the second film is faster than an etching rate of the first film, to form a recess and expose a partial surface area of the first film on a bottom of the recess;

ashing and removing the resist film; and

dry-etching the first film exposed on the bottom of the recess by using mixture gas of fluorocarbon gas added with at least one of SF_6 and NF_3, to expose the conductive member of the substrate.

8. A method according to claim 7, wherein the step of forming the first film the first film is formed by chemical vapor deposition using tetramethylsilane and carbon dioxide as source gasses and by setting a ratio of a flow rate of tetramethylsilane to a flow rate of carbon dioxide to a range from 0.2 to 0.6.

9. A method of manufacturing a semiconductor device, comprising steps of:

preparing a substrate having a wiring exposed on a partial area of

an insulating surface of the substrate;

forming a first film on the surface of the substrate, the first film being made of hydrogenated silicon carbide;

forming a second film made of insulating material on the first film, the insulating material having a different etching resistance from silicon carbide;

forming a third film on the second film, the third film being made of hydrogenated silicon carbide;

forming a first resist film with a first opening on the third film, the first opening overlapping with a partial area of the conductive member as viewed along a line parallel to a normal to the substrate surface;

etching the third film by using the resist mask as an etching mask and using mixture gas of fluorocarbon gas added with at least one of SF_6 and NF_3 to expose a partial surface of the second film;

removing the first resist film;

forming a second resist film with a second opening on surfaces of the etched third film and exposed second film, the second opening being included in an area of the first opening and partially overlapping with the wiring;

etching the second film at least to an intermediate depth thereof by using the second resist mask as an etching mask;

removing the second resist film;

etching the third film by using the partially etched third film as a mask to form a via hole reaching the first film in an area where the second opening is formed, and to form a wiring groove to an intermediate depth of the second film in an area where the first opening is formed and the second opening is not formed;

dry-etching the first film exposed on the bottom of the via hole by

using mixture gas of fluorocarbon gas added with at least one of SF_6 and NF_3, to expose the wiring; and

burying insides of the via hole and wiring groove with a conductive member.

10. A method according to claim 9, wherein the step of forming the first film the first film is formed by chemical vapor deposition using tetramethylsilane and carbon dioxide as source gasses and by setting a ratio of a flow rate of tetramethylsilane to a flow rate of carbon dioxide to a range from 0.2 to 0.6.

11. A method of manufacturing a semiconductor device, comprising steps of:

forming a first film of silicon carbide on a surface of a semiconductor substrate by chemical vapor deposition using tetramethylsilane and carbon dioxide as source gasses and by setting a ratio of a flow rate of tetramethylsilane to a flow rate of carbon dioxide to a range from 0.2 to 0.6;

forming a second film on the first film, the second film being made of insulating material having a different etching resistance from silicon carbide;

forming a resist film with an opening; and

etching the second film by using the resist film as an etching mask under a condition that an etching rate of the second film is faster than an etching rate of the first film to partially expose the first film.

12. A method according to claim 11, wherein the second film is made of fluorosilicate glass.